

PHASE 2A, MANOR GARDENS DEVELOPMENT, WREXHAM ROAD, RHOSTYLLEN
NOISE IMPACT ASSESSMENT

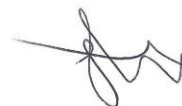
On behalf of:
SG Estates

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NOISE IMPACT ASSESSMENT**

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1.0 INTRODUCTION

1.1 Hepworth Acoustics Ltd was commissioned by SG Estates to carry out an assessment of railway noise for an approved residential development on land off Wrexham Road in Rhostyllen and advise on any necessary noise mitigation measures for the development.

1.2 The application for the development was originally granted in 2006 as part of the Manor Garden development and was supported with a noise survey prepared by SRL (ref: C/05/6W/1578/R01/PVCS/jsc) which concluded:

'Any development to take place within 46m from the rail line will require higher specification glazing and ventilation to achieve the night-time L_{Amax} requirements, as set out in BS 8233: Sound Insulation and Noise Reduction for Buildings' of 45 dB.

The following specifications will produce the attenuation needed:

- 10mm float glass/12mm air gap/6.4mm float glass
- Mechanical ventilation'

1.3 A S73 planning application has been submitted to alter the Phase 2a site layout and the local authority has requested an updated noise assessment, as some of the changes are to dwellings close to the railway line.

1.4 The development site location is shown in Figure 1 and is situated in a primarily residential area. Figure 1 shows that the development land is a grassed field located to the north side of the Shrewsbury to Chester railway line. The line is a passenger line used by two to three carriage services with light freight usage. The topography of the site is such that the line passes the site at grade.

1.5 Plots 52-60 of the development will be exposed to noise from the railway line and the remainder of the dwellings will be shielded by the dwellings that are closer. The nearest dwellings to the railway line are around 20m from the site boundary and 30m from the edge of the nearside track.

1.6 The site is bounded to the north and north east by fields which are allocated for dwellings as part of the wider Manor Gardens development, beyond this is Wrexham Road (A5152) a lightly trafficked road which is around 120m from the Phase 2a site area. To the south west are dwellings that are under construction as part of the wider Manor Gardens development.

1.7 The noise assessment has therefore included:

- An inspection of the site;
- Measurement of railway noise levels in the Southern area of the site;
- Assessment of railway noise impact on the development; and
- Recommendation of appropriate noise mitigation measures where necessary.

1.8 The various noise units and indices referred to in this report are described in Appendix I. All noise levels mentioned in the text have been rounded to the nearest decibel, as fractions of decibels are imperceptible.

2.0 RAILWAY NOISE SURVEY

- 2.1 A railway noise survey has been carried out at a location 2 metres back from the south eastern boundary of the site and 12m from the track. The location is indicated on Figure 1.
- 2.2 The site was not considered to be sufficiently secure for us installation of unattended noise monitoring instrumentation and therefore an attended noise survey of a sample of individual passing trains was carried out for a representative period of the daytime.
- 2.3 The survey was carried out between 11:00 and 14:00 on Thursday 25th January 2024. The noise monitoring was carried out at a microphone height of approximately 1.5 metres above the ground. Calibration checks of the sound level meter were carried out before and after the noise survey with no significant variance in levels observed. Details of the instrumentation used, weather conditions, etc. are stated in Appendix II.
- 2.4 Based upon timetable information, we understand that the total weekday (07:00-23:00) two-way flow of passing trains is up to 33 (approximately two per hour). During the whole of the night-time period (23:00-07:00) there is typically a total of only five passenger trains, the majority of which are between 06:00 and 07:00. The number of trains running on the line has significantly reduced from the timetable at the time of the original application in 2006.
- 2.5 We understand that there are up to 13 freight trains during the daytime and two during the night time, but these run according to demand and often do not run. A single timetabled freight train passed during the noise survey.
- 2.6 The noise levels were measured during the passage of a sample of trains in terms of the 'sound exposure level' (L_{AE}) and the maximum sound pressure level, L_{Amax} .
- 2.7 The daytime (07:00-23:00) 16-hour noise exposure value and night-time (23:00-07:00) 8-hour noise exposure value has been calculated from the results as described below.
- 2.8 The measured sound exposure levels (L_{AE}) were between 80 – 91 dB L_{AE} . The measured short-term peaks of noise from passing trains were found to be within the range of 80 – 90 dB L_{Amax} .
- 2.9 The results of the railway noise survey are detailed in Appendix II and the data has been used in the analysis below.

Railway Noise Exposure Values

- 2.10 Railway noise is evaluated in terms of the 'equivalent continuous noise level', L_{Aeq} . The daytime and night-time L_{Aeq} values have been calculated from the results of the noise survey using the standard formula:

$$L_{Aeq(T)} = L_{AE \text{ Average}} + 10 \log N - 10 \log T$$

where: $L_{Aeq(T)} = L_{Aeq}$ over time period T
 $L_{AE \text{ Average}} = \text{Average 'Sound Exposure Level'}$
 N = Number of train passes in time period T
 T = Time period in seconds

- 2.11 The daytime and night-time railway noise exposure values allowing for distance attenuation (20m) to the first row of dwellings are shown in Table 1.

Table 1: Railway noise exposure values (dB) at 20m from boundary

Daytime: 07:00-23:00	Night-time: 23:00-07:00
48 dB $L_{Aeq,16hr}$	41 $L_{Aeq,8hr}$

- 2.12 The values in Table 1 are modest levels of railway noise. This is due to there being a relatively low number of passing trains averaged over the 16-hour daytime period and 8-hour night-time period.
- 2.13 The equivalent peaks of noise (L_{Amax}) at a distance of 20m from the railway line would generally be in excess of 70 dB.
- 2.14 The implications of the railway noise exposure values are discussed in the following sections.

Comments on Railway Noise Exposure Levels

- 2.15 The results of the railway noise survey have been assessed in accordance with the guidance in 'Technical Advice Note (Wales) 11 – Noise', 1997 (TAN 11) and CL-01-15 updates. The TAN 11 Noise Exposure Categories (NECs) for railway noise are shown in Table 5.
- 2.16 TAN 11 sets out Noise Exposure Categories (NECs) for proposed residential development land that is exposed to different types of noise, and their suitability for residential use. The NECs for land exposed to railway noise (which are 'free field' values) are shown in Table 2.

Table 2: TAN 11 Railway Noise Exposure Categories

	Noise Exposure Category (NEC)			
	A	B	C	D
Daytime (07:00-23:00)	<55	55-66	66-74	>74
Night-time (23:00-07:00)	<45*	45-59*	59-66	>66

[* sites where noise events regularly exceed 82 dB L_{Amax} several times in any hour at night should be treated as being in Category C]

Category A - Noise need not be considered as a determining factor in granting planning permission.

Category B - Noise should be taken into account and steps taken to ensure an adequate level of protection against noise.

Category C - Planning permission should not normally be granted. Where development is permitted, steps should be taken to ensure a commensurate level of protection against noise.

Category D - Planning permission should normally be refused.

2.17 Thus, the daytime railway noise exposure level at 20 metres from the northern site boundary at this site (shown in Table 1) falls into NEC A of TAN 11. The night-time railway noise exposure level also falls into NEC A of TAN 11.

2.18 Thus, the railway noise exposure levels at the proposed location of the dwellings are suitable for residential development levels and noise need not be considered as a determining factor.

2.19 Appropriate acoustic design goals for the dwellings are discussed in Section 3.0 and our recommendations for noise mitigation are set out in Section 4.0.

3.0 ACOUSTIC DESIGN CRITERIA

- 3.1 The most relevant national guidance on appropriate acoustic design goals for residential development is set out in BS 8233: 2014, *Guidance on sound insulation and noise reduction for buildings*, (referred to hereafter as BS 8233) which carries the full weight of an adopted British Standard. The design criteria recommended in BS 8233 for daytime periods (07:00 – 23:00) and night-time periods (23:00 – 07:00) are summarised in Table 3:

Table 3: BS 8233 Recommended Acoustic Design Criteria

Activity	Location	07:00 – 23:00	23:00 – 07:00
Resting	Living room	35 dB $L_{Aeq,16hr}$	
Dining	Dining room/area	40 dB $L_{Aeq,16hr}$	
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq,16hr}$	30 dB $L_{Aeq,8hr}$

- 3.2 BS 8233 also states that, “*where development is considered necessary or desirable ... the internal target levels [i.e. those in Table 6 above] may be relaxed by up to 5dB and reasonable internal conditions still achieved*”.
- 3.3 BS 8233 states that if there is a reliance on closed windows to meet the guide values, “*there needs to be an appropriate alternative ventilation that does not compromise the façade insulation or the resulting noise level*”.
- 3.4 BS 8233 also recognises that regular individual noise events at night can cause sleep disturbance. Peaks of noise from individual events are usually described in terms of L_{Amax} values and these can be highly variable and unpredictable such that for design purposes it is usual to take into account the findings of research described in WHO *Community Noise Guidelines* that states, “*for a good sleep, it is believed that indoor sound pressure levels should not exceed approximately 45 dB L_{Amax} more than 10-15 times per night*”.
- 3.5 Therefore, for this development we recommend the following noise criteria be adopted with windows closed and trickle ventilation provided:
- Daytime noise below 35 dB L_{Aeq} inside living rooms and bedrooms; and
 - Night-time noise levels not exceeding 30 dB L_{Aeq} and generally not exceeding 45 dB L_{Amax} in bedrooms i.e. not more than 10-15 times per night.

- 3.6 Meeting the above adopted noise criteria will provide a good standard of protection of residential amenity for future residents of the proposed development.
- 3.7 For outdoor amenity spaces such as private gardens and patios, BS 8233 states that 'it is desirable that the external noise level does not exceed 50 dB $L_{Aeq,T}$ with an upper guideline value of 55 dB $L_{Aeq,T}$ which would be acceptable in noisier environments'.
- 3.8 However, the standard also recognises that these guideline values are not achievable in all circumstances where development might be desirable, particularly for development sites adjoining the 'strategic transport network'. In such cases (i.e. where noise levels would be above 55 dB L_{Aeq}) BS 8233 states that the development should be designed to minimise noise levels as far as is practicable 'but should not be prohibited'.
- 3.9 On this basis, our recommendations for noise mitigation are described in Section 4.

4.0 NOISE MITIGATION SCHEME

Gardens

- 4.1 The daytime railway noise exposure level at 20 metres from the site boundary (i.e. in the rear gardens of the proposed houses) was found to be 48 dB $L_{Aeq,16hr}$ which is below the lower limit of 50 dB(A) that is recommended for gardens in BS 8233.
- 4.2 Therefore, no specialist noise mitigation measures in respect to external noise need to be installed.

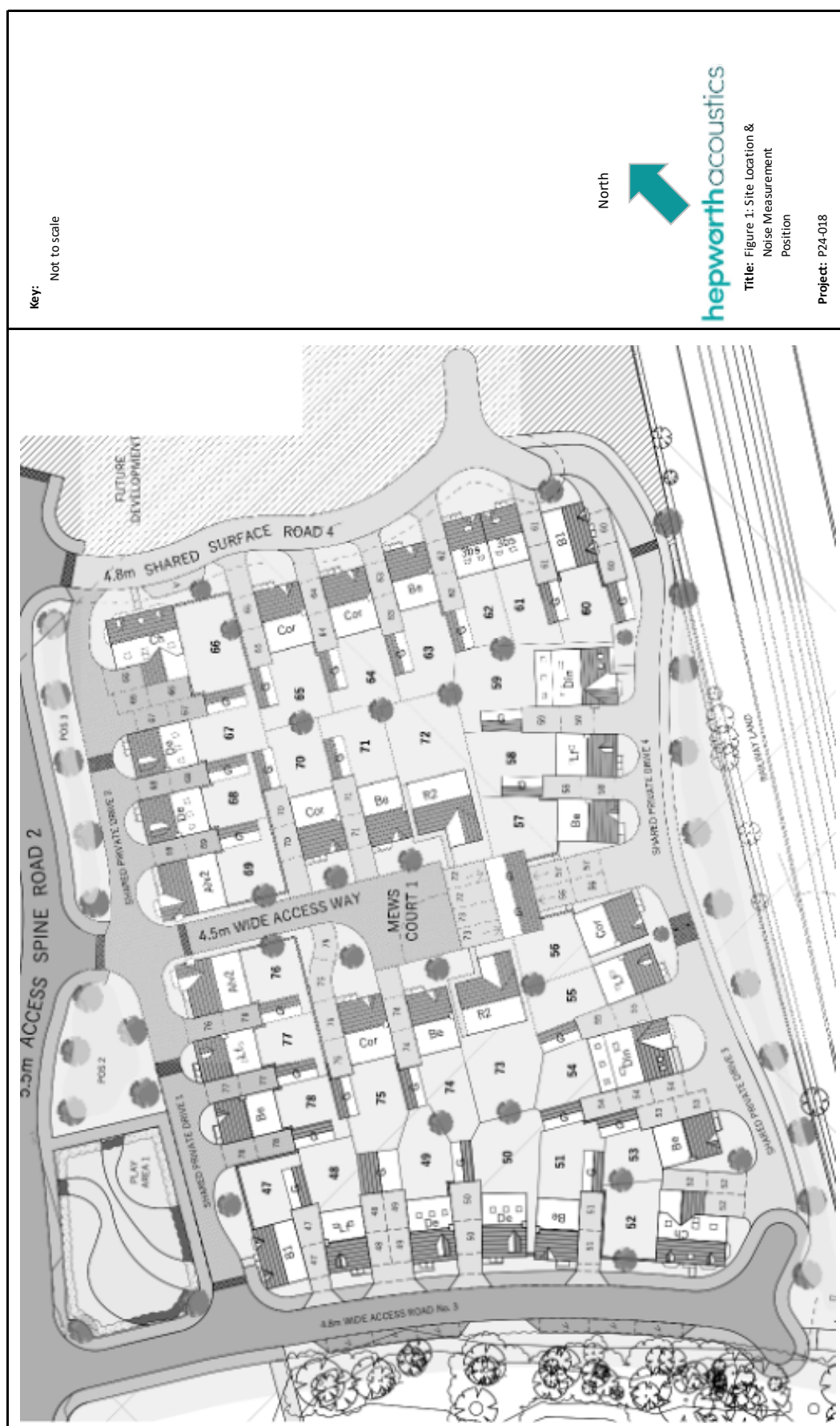
Sound Insulation of Dwellings

- 4.3 Windows of standard well-sealed thermal double glazing (4mm glass – 4mm glass) have a typical sound reduction performance of 25 dB $R_w + C_{tr}$. Therefore, where railway noise levels exceed 60 dB $L_{Aeq,16hr}$ during the daytime and/or 55 dB $L_{Aeq,8hr}$ at night, and/or 70 dB L_{Amax} for more than 10 times a night, higher specification glazing will be necessary.
- 4.4 As noise levels are below the above thresholds, and there are no more than seven trains timetabled during the entire night, we consider that for all living rooms & bedrooms the criteria set out in paragraph 3.5 will be achieved without the need for specialist acoustic double glazing or ventilation.

5.0 SUMMARY AND CONCLUSION

- 5.1 The impact of railway noise has been assessed for the proposed Phase 2a residential development at land off Wrexham Road in Rhostyllen.
- 5.2 The assessment has included the measurement railway noise at an appropriate location on the site and calculation of the daytime and night-time railway noise exposure levels.
- 5.3 Railway noise levels are low, and as such no specialist noise mitigation measures for the control of external and internal noise levels will be necessary.
- 5.4 An appropriate sound insulation scheme for the development has been described in this report.





Appendix I: Noise Units & Indices

Sound and the decibel

A sound wave is a small fluctuation of atmospheric pressure. The human ear responds to these variations in pressure, producing the sensation of hearing. The ear can detect a very wide range of pressure variations. In order to cope with this wide range of pressure variations, a logarithmic scale is used to convert the values into manageable numbers. Although it might seem unusual to use a logarithmic scale to measure a physical phenomenon, it has been found that human hearing also responds to sound in an approximately logarithmic fashion. The dB (decibel) is the logarithmic unit used to describe sound (or noise) levels. The usual range of sound pressure levels is from 0 dB (threshold of hearing) to 120dB (threshold of pain).

Due to the logarithmic nature of decibels, when two noises of the same level are combined together, the total noise level is (under normal circumstances) 3 dB(A) higher than each of the individual noise levels e.g. 60 dB(A) plus 60 dB(A) = 63 dB(A). In terms of perceived 'loudness', a 3 dB(A) variation in noise level is a relatively small (but nevertheless just noticeable) change. An increase in noise level of 10 dB(A) generally corresponds to a doubling of perceived loudness. Likewise, a reduction in noise level of 10 dB(A) generally corresponds to a halving of perceived loudness.

The ear is not equally sensitive to sound at all frequencies. It is less sensitive to sound at low and very high frequencies, compared with the frequencies in between. Therefore, when measuring a sound made up of different frequencies, it is often useful to 'weight' each frequency appropriately, so that the measurement correlates better with what a person would actually hear. This is usually achieved by using an electronic filter called the 'A' weighting, which is built into sound level meters. Noise levels measured using the 'A' weighting are denoted dB(A) or dBA.

Frequency and Hertz (Hz)

As well as the loudness of a sound, the frequency content of a sound is also very important. Frequency is a measure of the rate of fluctuation of a sound wave. The unit used is cycles per second, or hertz (Hz). Sometimes large frequency values are written as kiloHertz (kHz), where 1 kHz = 1000 Hz.

Young people with normal hearing can hear frequencies in the range 20 Hz to 20 kHz. However, the upper frequency limit gradually reduces as a person gets older.

Glossary of Terms

When a noise level is constant and does not fluctuate, it can be described adequately by measuring the dB(A) level. However, when the noise level varies with time, the measured dB(A) level will vary as well. In this case it is therefore not possible to represent the noise climate with a simple dB(A) value. In order to describe noise where the level is continuously varying, a number of other indices can be used. The indices used in this report are described below.

- L_{Aeq} This is the A-weighted 'equivalent continuous noise level' which is an average of the total sound energy measured over a specified time period. In other words, L_{Aeq} is the level of a continuous noise which has the same total (A-weighted) energy as the real fluctuating noise, measured over the same time period. It is increasingly being used as the preferred parameter for all forms of environmental noise.
- L_{Amax} This is the maximum A-weighted noise level that was recorded during the monitoring period.
- L_{A10} This is the A-weighted noise level exceeded for 10% of the time period. L_{A10} is usually used as a measure of traffic noise.
- L_{A90} This is the A-weighted noise level exceeded for 90% of the time period. L_{A90} is used as a measure of background noise.
- L_{AE} This is the A-weighted 'Sound Exposure Level' which is used for measuring discrete noise events. Essentially it is a measure of the sound energy of the whole noise event normalised to a period of 1 second. The SEL value can be used to calculate the actual L_{Aeq} value for a given time period if the number of noise events is known.

Appendix II: Noise Survey Results

Date(s):	Thursday 25 th January 2024
Equipment:	NTi XL2 'Class 1' sound level meters (s/n: A2A-20361-E0 & A2A-20228-E0) with associated calibrator and environmental outdoor monitoring kit
Weather:	Dry, ~13°C, clear skies and calm <3 m/s

All levels in dB(A)

Location 1: Railway Noise Survey

Time	Direction	Measured Noise Levels (dB)		Comments
		L _{Amax}	SEL	
10:40	South	83.4	86.8	Light Passenger
10:56	North	88.9	89.8	
11:57	North	79.7	80.1	
12:01	North	82.6	88.0	
12:46	South	86.2	86.5	
12:54	North	81.1	84.8	Freight
11:36	North	83.2	89.9	